

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001



Reply to Airmail

Space Operations Mission Directorate

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Federal Communications Commission
Office of the Secretary

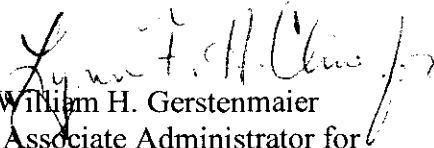
Ms. Marlene H. Dortch
Office of the Secretary
Federal Communications Commission
236 Massachusetts Avenue, NE
Suite 110
Washington, D.C. 20002

Re : RM-11351 ; Jansky-Bartmat Petition for Rule Making, Requests the Commission to modify its rules to implement the results of the WRC-03 in the band 13.75-14.00 GHz

Dear Ms. Dortch:

The National Aeronautics and Space Administration is an interested party in the Jansky-Barmat Telecommunications, Inc. Petition for Rule Making, referenced above. NASA strongly opposes this Petition for Rule Making and respectfully submits the attached Reply Comments.

Sincerely,


William H. Gerstenmaier
Associate Administrator for
Space Operations

Enclosures: 4 copies of Reply Comments to RM -- 11351

cc: NASA/Robert E. Spearing

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BEFORE THE
Federal Communications Commission
WASHINGTON, D.C. 20554

In the Matter of

Jansky-Barmat Telecommunications, Inc.)
Requests the Commission to modify its) RM – 11351
Rules to implement the results of)
WRC-03 in the band 13.75-14.00 GHz)

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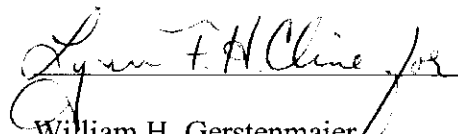
Federal Communications Commission
Office of the Secretary

To: The Commission

REPLY COMMENTS
of the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Respectfully Submitted,

By:


William H. Gerstenmaier
Associate Administrator for
Space Operations

January 17, 2007

General

On December 1, 2006, the Commission released a Public Notice¹ soliciting comments in response to a petition for Rule Making (Petition)² filed by Jansky-Barmat Telecommunications, Inc. The Petition requests changes to Parts 2 and 25 of the Commission's Rules to allow for fixed-satellite service (FSS) earth stations with antennas as small as 1.2m (very small aperture antennas - (v-sats)), in the 13.75-14 GHz band and to allow for blanket licensing of such earth stations. In response the Commission's received comments from HISPAMAR SATELLITES, the European Satellite Operators Association, and joint comments were filed by Intel, Ltd., New Skies Satellites, Inc., SES Americom, Inc., Loral Skynet Corp., Artel, Inc., Arrowhead Global Solutions, Inc., Spacenet, Inc., and Hughes Network Systems, LLC (Comments).³ As a co-primary Federal Government user of spectrum in this band, the National Aeronautics and Space Administration (NASA) takes this opportunity to provide reply comments in response to this Petition and Comments, which we oppose.

NASA has a keen interest in this proceeding because the 13.4-14.2 GHz band is allocated to the Federal Government Space Research Service (SRS) and is used by NASA for critical and essential communication for many of NASA's space-based missions, including the Space Transportation System (also known as the Space Shuttle or STS) and the International Space Station (ISS). This band is the "backbone" band for NASA's space network and supports NASA's Tracking and Data Relay Satellite System (TDRSS). Specifically, NASA uses the 13.75-14 GHz portion of this band for the TDRSS forward-link and wideband downlink. These links are critical to NASA's overall mission since there are no practical spectrum alternatives for these links; and therefore, **there is no other means to continue providing services to existing TDRSS users should this band not be adequately protected.** Neither the Petition nor the Comments recognize the impact that the grant and implementation of this Petition would have on operations in the SRS band or address any options in resolving potential conflicts between new FSS operations and the SRS. Accordingly, as addressed below, we are providing for the public record why adoption of this Petition by the Commission would pose a significant risk to the TDRSS operations.

¹ See FCC Public Notice, Report No. 2796, December 1, 2006, petition for Rule Making filed by Jansky-Barmat Telecommunications, Inc.

² See - Petition for Rule Making filed by Jansky-Barmat Telecommunications Inc., February 24, 2006.

³ See Comments of HISPAMAR SATELLITES filed December 18, 2006; European Satellite Operators Association filed January 3, 2007; and Joint Comments of Intel, Ltd., New Skies Satellites, Inc., SES Americom, Inc., Loral Skynet Corp., Artel, Inc., Arrowhead Global Solutions, Inc., Spacenet, Inc., and Hughes Network Systems, LLC filed January 3, 2007.

Executive Summary

In responding to the Petition and the Comments filed in response to the Petition NASA requests that the Commission take into consideration the following:

- The 13.75-14 GHz band is an essential band for Federal Government space operations. It is the only band available within the U.S. for wideband TDRSS downlink operations, and the only band that can support legacy forward links to existing TDRSS user missions;
- NASA has invested billions of dollars in space-based equipment and assets that are dependent on reliable uninterrupted communications in this band;
- Allowing for blanket licensing and therefore ubiquitous deployment of v-sat earth stations in the 13.75-14.0 GHz portion of the band would greatly increase the number of FSS transmitting earth stations in this band, and the probability that some of these terminals may operate within interference range of one of the TDRSS receiving earth stations that operate in the 13.4-14.05 GHz band, unless adequate constraints are placed on the allowed geographic areas of these terminals.
- Authorization of ubiquitous deployment of v-sats in the 13.75-14 GHz band without coordination with NASA would pose a significant potential for interference to reception at existing and planned TDRSS earth stations;
- To provide adequate regulatory protection for the TDRSS forward link, and consistent with the U.S. WRC-03 position, the coordination requirements of footnote US337 and the power limits of footnote US357, both footnotes to the United States Table of Frequency Allocations, must be maintained and enforced;
- The Petition mischaracterizes the current allocation status for the SRS that is provided by international footnote 5.503 and US footnote US357 as secondary, when in fact both footnotes provide co-equal status for certain SRS systems with the FSS;
- In view of the important nature of the Federal Government space operations in this band such operations must have regulatory protection from any new v-sat uses of this band. Additionally, this protection should be extended nationally to all TDRSS networks, and not limited to just those TDRSS orbital locations registered with the ITU prior to January 1992. Further, this protection should be afforded to not only the two existing and operational TDRSS earth stations at White Sands, New Mexico and Guam but also to the planned TDRSS East Coast earth station.

Background:

The Petition requests modification of the Commission's Rules related to the FSS (Earth-to-space) operations in the 13.75-14 GHz band. Specifically, the Petition requests modification of FCC Rules Parts 2 and 25 to remove requirements that earth stations in the 13.75-14 GHz band use antennas with an aperture of at least 4.5 meters and to allow authorization of earth stations with antenna apertures as small as 1.2 meters. The Petition also requests the removal of requirements for coordination for FSS earth stations in this band and instead seeks to permit v-sat authorization under blanket licenses.

In support of the requested regulatory changes, the Petition states that the 2003 International Telecommunication Union (ITU) World Radiocommunication Conference modified the conditions for use of this allocation internationally to allow for the implementation of FSS earth stations with antennas as small as 1.2 m and that this change should be implemented domestically. The Petition claims that these changes would greatly enhance the possible FSS services to the American marketplace, and that the FSS has been inhibited by the imbalance between the spectrum availability of only 500 MHz in the Ku-band uplink allocations, compared to 750 MHz of Ku-band downlink spectrum. The Petition notes that such enhanced FCC services are capable of being provided by a number of geostationary communication satellites already providing service to the United States. All three commenters supported the Petition.

SRS Allocation Status:

We note that the Petition mischaracterizes the current allocation status for the SRS in the 13.75-14 GHz band that is provided by international footnote 5.503 and by United States footnote US357 to the Table of Frequency Allocations. The Petition quotes the text for international footnote 5.503 **but changes the last phrase of the first sentence** of the footnote from “shall operate **on an equal basis** with stations in the fixed-satellite service; ...” to “shall operate on a secondary basis.”⁴ In fact, both the international and United States footnotes provide geostationary space stations in the space research service for which information for advanced publication has been received by the ITU Radiocommunication Bureau prior to 31 January 1992 with co-equal status with the FSS.⁵ The correct text for the introductory language to footnote US357, which implements domestically the portion of international footnote 5.503 is as follows:

“US357 In the band 13.75-14 GHz, geostationary space stations in the space research service for which information for advance publication has been received by the ITU Radiocommunication Bureau (Bureau) prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. Until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band:”

TDRSS Operations:

TDRSS is a NASA mission-critical asset supporting many different and important space missions, including the STS and the ISS. The TDRSS consists of nine in-orbit telecommunications satellites stationed at geosynchronous altitude and associated ground stations. The TDRSS earth stations are located at White Sands, New Mexico, and on the

⁴ See note 2 *supra*, at page 7.

⁵ 47 C.F.R. Sec. 2.106, US357

island of Guam in the South Pacific. Further, the deployment of a third earth station on the East Coast is being planned in order to expand the usefulness of this important asset. The design and use of the TDRSS provides NASA with autonomous United States operations, avoiding the cost and uncertainty of constructing earth stations on foreign soil.

This system of satellites and ground stations serves as the communications “backbone” for NASA’s Space Network (SN) which provides mission services for near-earth user satellites and orbiting vehicles. Specifically, the STS, the ISS, many near-earth spacecraft and science satellites are totally dependent upon TDRSS for command and control communications, mission communications, and important data downlink communications. NASA’s investment in TDRSS and in space systems that depend on reliable communications in this band is in excess of several billion dollars. NASA has a long term commitment to this band; in addition to the assets already deployed, NASA continues to design and build two new TDRSS satellites that will operate in this band as well as new space science mission satellites that will utilize TDRSS. Because of this investment and commitment by NASA to this band and because of the importance and critical nature of the communications services TDRSS provides, it is essential that such operations in this band remain reliable, robust, and free of radio frequency interference (RFI) from other users of the spectrum.

Band Critical for Government Uses

TDRSS operates in the Space Research Service (SRS) with its primary communication links, including the forward-link and wideband downlink, in the 13.4 – 14.2 GHz-band. The TDRSS’s forward links are in the 13.75-13.8 GHz portion of the band. The forward link is a space-to-space link from the TDRSS geostationary satellite to a low-earth orbiting (LEO) spacecraft. This relay link is essential when a LEO spacecraft is over the horizon and not capable of direct communications with ground stations. The link carries important command and control information and other important communications, as well as data needed by the LEO, particularly when the link is to the STS or ISS. TDRSS uses the 13.4-14.05 GHz band for a wideband downlink from the TDRSS geostationary spacecraft to the ground stations and requires protection over the entire 13.75-14.0 GHz band that is the subject of the petition. This relay link is used to bring back to earth important scientific and mission data particularly when there is a large amount of data that must be down-loaded in a contiguous data stream. Again, this link is essential for the STS and ISS as well as other NASA systems.

NASA launched the first TDRSS satellite on April 4, 1983, and has been using this band continuously ever since. Many of the space missions that NASA now flies have been designed to require the use of TDRSS and the 13.75-14 GHz band. There are a large number of legacy systems that use this band and will continue to use this band for the foreseeable future. Further, NASA cannot move the TDRSS forward or downlink operations to any other bands for the following reasons: 1) it needs to continue to support legacy systems that currently require the use of the TDRSS Ku-band forward link; and 2)

there are no viable alternative allocations within the current allocation framework that could compatibly support the TDRSS downlink operations. Therefore, NASA has a long term commitment to the 13.4-14 GHz band to support its TDRSS downlink and forward link operations and the 13.75-14.0 GHz portion of that band is essential. Accordingly NASA, through NTIA and the FCC, must ensure that these operations have sufficient regulatory protection for the foreseeable future.

Spectrum Sharing Issues

The current allocation for the FSS and the allocation framework to protect the incumbents in the 13.75-14 GHz band was developed and adopted by the Commission in its proceeding in ET Docket No. 96-20.⁶ In that proceeding, the Commission recognized TDRSS as “a critical national asset that provides communication links for U.S. space and satellite operations” and “that it is imperative that these important services be protected appropriately from harmful interference from FSS operations.”⁷ To provide this protection, the Commission adopted footnotes to the Table of Frequency allocations contained in Section 2.106 of its Rules that require both coordination and power limits for all FSS earth stations that operate in the 13.75-14 GHz. These protection requirements must be maintained to protect the TDRSS forward link.

In order to protect the TDRSS forward-link the Commission adopted US footnote US337 to the Table of Frequency Allocations, which requires all FSS operations in the 13.75-13.8 GHz band to coordinate the site location of each earth station through the Interdepartment Radio Advisory Committee’s (IRAC) Frequency Assignment Subcommittee (FAS). The text for US337 is as follows:⁸

“US337 In the band 13.75-13.80 GHz, earth stations in the fixed-satellite service shall be coordinated on a case-by-case basis through the frequency assignment subcommittee in order to minimize harmful interference to the Tracking and Data Relay Satellite System’s forward space-to-space link (TDRSS forward link-to-LEO).”

The Commission also imposed the power limits codified in US357, listed above, in order to protect the TDRSS forward link. Also the co-primary status provided by Footnote US357 provides protection for the TDRSS wideband downlink by requiring coordination of all FSS in the entire 13.75-14 GHz band.⁹ In addition, the Commission’s Report and Order resulting from the FCC Rule Making referenced above recognizes the need to protect TDRSS earth stations by not allowing transmitting FSS earth stations to locate

⁶ See FCC 96-377, ET Docket No. 96-20, Amendment of Parts 2, 25 and 90 of the Commission’s Rules to Allocate the 13.75-14.0 GHz Band to the Fixed-Satellite Service; Report and Order; September 12, 1996.

⁷ *id.* at 18.

⁸ See note 5 *supra*, at US337.

⁹ See note 6 *supra*, at 20.

near the TDRSS ground receive sites. The Commission's Report and Order states the requirement that FSS earth stations must coordinate with NASA through the FAS process as follows:¹⁰

"21. ...TDRSS satellites use the entire 13.75-14.0 GHz band as a downlink to communicate with two earth stations at the White Sands Complex in New Mexico: (1) the White Sands Ground Terminal is located at 106° 36' 31" West Longitude and 32° 29' 54" North Latitude; and (2) the Second TDRSS Ground Terminal is located at 106° 36' 48" West Longitude and 32° 32' 40" North Latitude. During the FAS process, FSS earth stations proposing to operate in the 13.75-14.0 GHz band will be coordinated with these TDRSS earth stations and with the TDRSS forward link-to-LEO in order to minimize harmful interference to their operations. Moreover, we observe that the FAS will apply the methods and criteria of Appendix 28 of the ITU Radio Regulations in order to protect the TDRSS earth stations. In this regard, we note that NASA has converted the Appendix 28 requirements into a 390 kilometer (242.3 mile) coordination radius centered at 106.6° West Longitude and 32.5° North Latitude. As mentioned earlier, we are adopting US337 in order to protect the forward link-to-LEO when this link is operated in its wideband mode. In addition, we are revising the text of US337 to clarify that the purpose of the footnote is to protect the TDRSS forward link-to-LEO in particular."

Since the Rule Making referenced above, NASA has built a second earth station in Guam and is planning a third earth station that would be located on the East Coast. These ground stations require the same level of protection as the White Sands, New Mexico station, which may only be achieved by limiting the operational areas of the proposed new v-sat service, or by requiring coordination of v-sat terminals that may be within range of a TDRSS earth station through the FAS coordination process.

It is clear, that the protection now afforded to TDRSS operations in the 13.75-14 GHz band must be maintained. If the FCC allows v-sats to be authorized under blanket licenses, there will be no coordination of the FSS earth stations through the FAS process. Under this situation, it will not be possible to prevent v-sat earth stations from being deployed close to the TDRSS earth stations. While the FSS uplink EIRP density constraints of US footnote US357 should eliminate interference to the TDRSS forward link, this will do little to protect the TDRSS wideband downlink from v-sat transmissions conducted within interference range of the TDRSS receiving earth stations.

The Petition claims that the proposed regulatory changes would make domestic policy consistent with international policy. However, it should be noted that the problem of close proximity of v-sat operations to TDRSS receiving earth stations was not a consideration during the WRC-03 process which allocated the band for v-sats, since there are no TDRSS earth stations located outside the United States and Possessions. If v-sat operations are allowed within the United States and Possessions in close proximity to TDRSS earth stations, there is a significant chance for interference to occur to the TDRSS downlinks. Therefore, United States domestic policies for this band must take

¹⁰ Id. at 21.

into consideration not only the international policy for this band, but also the domestic operations that exist in this band.

Accordingly, there must be a regulatory framework in the 13.75-14 GHz band with geographic restrictions that prevent v-sat operations within interference range of the TDRSS earth stations in order to protect the reception of the TDRSS downlink. Further, consistent with the U.S. WRC-03 position and proposed in the petition, the existing power density restrictions of ITU 5.503 must be applied to v-sats terminals that use the 13.75-13.8 GHz band in order to protect the TDRSS forward-link. Additionally, this protection should be extended nationally to protect all TDRSS networks, and not limited to just those TDRSS orbital locations registered with the ITU prior to January 1992. Further, this protection should be afforded to not only the two existing and operational TDRSS earth stations at White Sands, New Mexico and Guam but also to the planned TDRSS East Coast earth station.

Summary:

The 13.75-14 GHz band is a critical band for NASA's TDRSS operations, as the band is used to support the TDRSS forward-link and a wideband downlink. The TDRSS relay operations are essential and a mission critical resource into which NASA has invested billions of dollars. There are no other spectrum alternatives to support current TDRSS user mission requirements, nor is there a practical spectrum alternative to support downlink requirements for future TDRSS systems. The current allocation framework provides protections for this mission critical resource. Neither the petition nor any of the comments filed to date have cited the need to protect TDRSS, nor the fact that the petition incorrectly identifies a secondary allocation status of the TDRSS space research service. Because of the lack of alternative spectrum options, NASA's financial commitment to the band, and the need to continue to support legacy systems for the foreseeable future, NASA has a long term commitment to this band. Therefore, this important Government requirement must continue to be protected by an adequate regulatory framework, which is not proposed in either the Petition or any of the Comments. Accordingly, NASA requests that the Commission deny the subject Petition.

CERTIFICATION OF SERVICE

I, James Madon, do hereby certify that on January 17, 2007, I served copy of the aforementioned Reply Comments of National Aeronautics and Space Administration upon the following parties by U.S. first-class mail, postage pre-paid:

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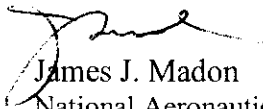
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